ON A HITHERTO UNKNOWN FAUNA OF MONTANE BIRDS IN CENTRAL MADAGASCAR.

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THE central high-plateau and mountains of Madagascar have been considered as being very poor in endemical birds. All species previously recorded from these regions have been well-known inhabitants of the coastal lowlands. The great Franco-Anglo-American Expedition, which recently has been undertaken, has explored the whole island, collecting about 12,000 birds, but could find only two species of birds peculiar to the central mountains in Madagascar. The first of these were the rare *Dromaeocercus seebohmi* Sharpe of which previously only the type-specimen was known. This bird, which is very different from the well-known forest-bird *Dromaeocercus brunneus* Sharpe, was rather common in the bush-vegetations on elevations more than 5,000 ft. in the mountainous massives Ankaratra and Tsaratanana, but nowhere else. Also the other mountain-bird, the peculiar rail *Lemurolimnas watersi* (Bartlett) was only known from the type (and co-types) secured in Betsileo, i.e. the high-plateau in the south of Madagascar. It has now been rediscovered in the north, at Andapa in the Tsaratanana Mountains at about 6,000 ft. altitude.

As a matter of fact, no new mountain-bird has been described from the collections of the expedition, though many (thirteen) new forms from the lowland were discovered. By careful examination of Madagascar birds I have found several birds peculiar to the central high-plateau, and as I think they are of some interest, their descriptions will follow below.

The following investigation is based on the collection of Madagascar birds in the British Museum (Nat. hist.) and the Museum National d'Histoire Natur. in Paris, which for the greater part consists of specimens collected during 1929–1931 by the Franco-Anglo-American Expedition, under the leadership of J. Delacour. It is a great pleasure to me to thank Dr. Lowe and Dr. Berlioz cordially for their kindness in giving me permission to work with these birds.

Newtonia brunneicauda monticola subsp. nov.

Type in the British Museum, ♂ ad., Manjakatompo, Ankaratra Mountains, coll. The Franco-Anglo-American Expedition (J. Delacour), 12.5.1929, no. 162.

Description : This is the most modified species among the mountain-birds. It is distinctly different in the colouration. On the under-parts it is more richly coloured with buff, being much darker than *N. b. brunneicauda* (Newton), on the upper-parts darker greyish-green, nearly dark sooty. The plumage is softer, the feathers longer than in *brunneicauda*.

Measurements : A larger form. The measurements of the wing are as follows :

N. b. brunneicauda : 72 ♂♂ from Eastern Madagascar (Vondrozo, Manombo, Ivohibe, Maroantsetra, Andapa &c.) measure : 52, 52, 52, 53, 53, 53, 53, 53, 53, 53, 53, 53, 53, 54, 54, 54, 54, 54, 54, 54, 54, 54, 54, 54, 55, 55, 55, 55, 55, 55,

55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 58, 58, 58, 58, 58 58 mm.

54 ♀♀ from the same localities measure : 52, 52, 53, 53, 53, 53, 53, 53, 53, 53, 54, 54, 54, 54, 54, 54, 54, 54, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 57, 57, 58, 58, 58 mm.

N. b. inornata : 24 ♂♂ from Western Madagascar (Lake Tsimanampetsotsa, Lake Iotry, Tabiky, Tsiandro, Marotony, Tsarakibany, Ambre Mountains, Anaborano, Vohemar) measure : 51, 51, 52, 52, 52, 52, 53, 53, 53, 53, 53, 53, 53, 54, 54, 54, 55, 55, 55, 55, 56, 56, 56, 56 mm.

23 ♀♀ from the same localities measure : 51, 51, 51, 51, 52, 52, 52, 52, 53, 53. 53, 54, 54, 54, 54, 54, 54, 54, 54, 55, 55, 56, 56 mm.

N. b. monticola : 13 ♂♂ from Monjakatompo measure : 58, 58, 59, 59, 59, 59, 60, 60, 60, 60, 60, 61, 61, 62 mm.

6 ♀♀ from the same locality measure : 58, 58, 58, 59, 61, 61 mm. The three races thus measure :

N. b. brunneicauda : ♂♂ 52–58 (55.14), ♀♀ 52–58 (54.89) mm.

N. b. inornata : ♂♂ 51–56 (53.63), ♀♀ 51–56 (53.26) mm.

N. b. monticola : ♂♂ 58–62 (59.62), ♀♀ 58–61 (59.17) mm.

The difference in the measurements are best shown on the following schedule, giving the measurements of all specimens examined. Male and female are of the same size (as shown above) and are not kept apart.

Name of Subsp. :	Wing-length in mm. :											
	51	52	53	54	55	56	57	58	59	60	61	62
inornata	6	8	10	11	6	6	—	—	—	—	—	—
brunneicauda	—	5	18	20	39	22	13	9	—	—	—	—
monticola	—	—	—	—	—	—	—	5	5	5	3	1

The two lowland forms *inornata* and *brunneicauda* are nearly alike regarding the measurements, *inornata* being, however, on an average smaller. The greater part of the specimens of *monticola*, examined, are bigger than 58, only 5 birds are 58 and none are smaller. But of the 173 specimens of the two lowland forms, 164 or 95 per cent. are smaller than 58, only 9 specimens reaching this size.

Distribution : Only found at Manjakatompo in the Ankaratra Mountains, Central Madagascar.

Material : 192 specimens, which are distributed as follows :

126 *N. b. brunneicauda* (33 ♂♂, 22 ♀♀ in London ; 39 ♂♂, 32 ♀♀ in Paris).
47 *N. b. inornata* (13 ♂♂, 14 ♀♀ in London ; 11 ♂♂, 9 ♀♀ in Paris).
19 *N. b. monticola* (7 ♂♂, 3 ♀♀ in London ; 6 ♂♂, 3 ♀♀ in Paris).

Zosterops maderaspatana analoga subsp. nov.

Type in the British Museum, ♂ ad., Manjakatompo, Ankaratra Mountains, coll. The Franco-Anglo-American Expedition (J. Delacour), 3.5.1929, no. 61.

Description : Not differing from *Z. m. maderaspatana* (L.), except in having the throat darker and deeper yellow.

Measurements : A much larger form. The measurements of the wing are as follows :

Z. m. maderaspatana : 81 ♂♂ from the following localities : Maroantsetra, Andapa, Antalaha, Sianaka, Manombo, Vondrozo, Ivohibe, Tamatave, Marotony,

Ambre Mountains, Maromandia, Bezona, Tsarakibany, Tsiandro, Bekopaka, Namaroka, Tulear, Lake Ivtry, Tabiky, Ampotaka, measure: 53, 53, 54, 54, 54, 54, 54, 54, 54, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 58, 58, 58, 58, 58, 58, 58, 58, 58, 58, 58, 58, 58, 58, 59, 59, 59 mm.

69 ♀♀ from the same localities measure: 52, 52, 52, 53, 53, 53, 53, 53, 53, 54, 54, 54, 54, 54, 54, 54, 54, 54, 54, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 55, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 56, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 57, 58, 58, 58, 58, 58, 58, 58, 58, 59, 59 mm.

Z. m. analoga: 11 ♂♂ from Manjakatompo measure: 59, 59, 60, 60, 61, 61, 62, 64, 64, 64, 65 mm.; a single ♂ from Tsiroanomandidy measures: 62 mm.

5 ♀♀ from Manjakatompo measure: 61, 62, 62, 62, 63 mm. The two races thus measure:

Z. m. maderaspatana: ♂♂ 53–59 (56.33), ♀♀ 52–59 (55.72) mm.

Z. m. analoga: ♂♂ 59–65 (61.75), ♀♀ 61–63 (62.00) mm.

The differences in the measurements are best shown on the following schedule, giving the measurements of all specimens examined. Male and female are of the same size (as shown above) and are not kept apart.

Name of Subsp.:	Wing-length in mm.:													
	52	53	54	55	56	57	58	59	60	61	62	63	64	65
maderaspatana . . .	3	6	17	28	43	26	22	5	—	—	—	—	—	—
analoga	—	—	—	—	—	—	—	2	2	3	5	1	3	1

The greater part of the specimens of *analoga* examined are bigger than 59 mm., only 2 are 59 and none are smaller. The majority of the lowland-form *maderaspatana*, on the contrary, are smaller than 59 mm. Of 150 specimens examined 145 or 97 per cent. are smaller than 59, only 5 specimens reaching this size, and none being larger. The Mountain White-eye is thus modified analogous to *Newtonia*, therefore the designation *analogus*.

Distribution: Opposite to *Newtonia* we have evidence for the occurrence of the Mountain *Zosterops* on other localities on the high-plateau than Manjakatompo. A single male from Tsiroanomandidy, situated to the north-west of Manjakatompo, has a wing-length of 62 mm. and so belongs to *analoga*. A series of specimens captured at Iampasika, a place situated in the mountains south of Fianarantsoa (about 4,000 ft. elevation) which are not of so great height as the Ankaratra Mountains, are exactly intermediate between *madaraspatana* and *analoga*. 5 ♂♂ measure: 56, 57, 60, 61, 61 mm., average: 59·00 mm.

Centre of distribution is the Ankaratra Mountains, but *Z. m. analoga* is also to be found on the high-plateau farther to the west and south. Specimens from Iampasika are intermediate (*maderaspatana* ≷ *analoga*).

Material: 172 specimens, which are distributed as follows:

150 *Z. m. mader a spatana* (35 ♂♂, 29 ♀♀ in London; 46 ♂♂, 40 ♀♀ in Paris).

17 *Z. m. analoga* (5 ♂♂, 3 ♀♀ in London; 7 ♂♂, 2 ♀♀ in Paris).

5 *Z. m. mad.* ≷ *anal.*, from Iampasika (3 ♂♂ in London; 2 ♂♂ in Paris).

Saxicola torquata ankaratrae subsp. nov.

Type in the British Museum. ♂ ad., Manjakatompo, Ankaratra Mountains, coll. The Franco-Anglo-American Expedition (J. Delacour), 14.5.1929, no. 238.

Description : Not differing from *S. t. sibilla* (L.), the only difference being in the size.

Measurements : A much larger form. The measurements of the wing are as follows :

S. t. sibilla : 45 ♂♂ from the following localities : Maroantsetra, Vondrozo, Ambre Mountains, Manombo, Ampotaka, Ivohibe, Andapa, Tulear, Tamatave, Ankafana, measure : 64, 64, 64, 65, 65, 65, 65, 65, 66, 66, 66, 66, 66, 66, 66, 66, 66, 66, 67, 67, 67, 67, 67, 67, 67, 67, 68, 68, 68, 68, 68, 68, 69, 69, 69, 70, 70, 70, 70, 71, 71, 71, 71, 71 mm.

26 ♀♀ from the same localities : 63, 63, 64, 64, 64, 64, 64, 64, 65, 65, 65, 65, 65, 65, 66, 66, 66, 66, 66, 67, 67, 67, 67, 67, 69 mm.

S. t. ankaratrae : 7 ♂♂ from Manjakatompo and 2 ♂♂ from Manjaka measure : 73, 73, 74, 74, 74, 75, 75, 76, 76 mm.

5 ♀♀ from Manjakatompo measure : 73, 73, 73, 74, 74 mm. The two races thus measure :

S. t. sibilla : ♂♂ 64–71 (67·31), ♀♀ 63–67 (65·35) mm.

S. t. ankaratrae : ♂♂ 73–76 (74·44), ♀♀ 73–74 (73·40) mm.

The differences in the measurements are best shown on the following schedule, giving the measurements of all specimens examined. Male and female are somewhat different in size and are here kept apart.

Name of Subsp. :	Wing-length in mm. :												
	63	64	65	66	67	68	69	70	71	72	73	74	75	76
♂♂, *sibilla*	—	3	5	11	8	6	3	4	5	—	—	—	—	—
♂♂, *ankaratrae*	—	—	—	—	—	—	—	—	—	—	2	3	2	2
♀♀, *sibilla*	2	6	7	5	5	—	1	—	—	—	—	—	—	—
♀♀, *ankaratrae*	—	—	—	—	—	—	—	—	—	—	3	2	—	—

The montane form is bigger than 72 mm. both in male and female ; the lowland form never exceeds 71 mm.

Distribution : Centre of distribution is the Ankaratra Mountains, and the greater part of the material comes from Manjakatompo on the north-eastern slopes of these mountains. Two males, collected by Cowan, May 1881, on Manjaka, a smaller chain north of Tananarive not far from the Ankaratra Mountains, measure 74, 76 mm., and they are therefore typical *ankaratrae.* Some birds from Tsiroanomandidy, on the western portion of the high-plateau, are rather large and may be considered as belonging to *ankaratrae* ; they measure : ♂♂ 68, 72, 74 mm. But also some specimens from the central part of Western Madagascar, which is lowland, are long-winged. Three males from Tsiandro, Bekopaka, Bokarano, measure : 73, 74, 75 mm. In the valley north of Ankaratra, at Tananarive, at about 4,000 feet altitude, the birds are intermediate between *sibilla* in the coastal lowlands and *ankaratrae* in the mountains.

4 ♂♂ measure : 67, 71, 71, 71 mm., 1 ♀ measures : 71 mm.

S. t. ankaratrae so inhabits the mountains of Central Madagascar and the high-plateau ; in the central parts of the west its range, however, seems to

extend nearly or quite to the coast. The area, inhabited by *S. t. sibilla*, surrounds the breeding area of *ankaratrae*, as it is found in the coastal regions of the whole east, the south-west and the north.

Material : 96 specimens, which are distributed as follows :

71 *S. t. sibilla* (28 ♂♂, 12 ♀♀ in London ; 17 ♂♂, 14 ♀♀ in Paris).

14 *S. t. ankaratrae* (5 ♂♂, 3 ♀♀ in London ; 4 ♂♂, 2 ♀♀ in Paris).

11 *S. t. sibil.* ≷ *ankar.* from W. Central Madagascar and Tananarive (6 ♂♂ in London ; 4 ♂♂, 1 ♀ in Paris).

Monticola imerina interioris subsp. nov.

Type in the British Museum, ♂ ad., Manjakatompo, Ankaratra Mountains, coll. The Franco-Anglo-American Expedition (J. Delacour), 14.5.1929, no. 252.

Description : Not differing from *M. i. sharpei* (Gray). Perhaps the mountain birds have a tendency to be slightly paler, especially the females, but the difference certainly is too inconspicuous to be recognized.

I do not see any reason to separate the Madagascar genus *Pseudocossyphus* from *Monticola*. All *Pseudocossyphus*, however, are described as *Cossypha*, but I do not think they have anything to do with this genus, although their field-habits resemble more those of *Cossypha*, than of *Monticola*. I shall not here give my reasons for considering that the " *Pseudocossyphus* " forms belong to *Monticola* and not to *Cossypha*. It is sufficient to say, that there exists a very marked sexual difference in the Madagascar forms as in *Monticola*, whereas the sexes are alike in all *Cossypha*. Sharpe, the first describer of the female of *M. sharpei*, did not imagine that the sexes were different and therefore held the female to be the young bird (*Proc. Zool. Soc.*, London, 1871, p. 317). The maintenance of *Pseudocossyphus* as a special genus is quite unnecessary, which is proved by the fact that Sharpe separated *sharpei* as *Pseudocossyphus* (*Cat. Birds Brit. Mus.*, Vol. vii, 1883, p. 21), but kept *imerina* in *Cossypha* (*ibid.*, p. 35), whereas Sclater (*Syst. Av. Ethiop.*, p. 476) regards them as only subspecies, of the same species. I follow Sclater and unite the peculiar *imerina* from Western Madagascar with *sharpei* as one species, the name of which must stand as *imerina*, as this form was first described (Hartlaub, *Journ. f. Ornith.*, 1860, p. 97). Recently Delacour has studied these birds, and he considers *imerina* and *sharpei* as two different species (*L'Oiseau*, 1932, p. 59).

Measurements : A larger bird. The *Monticola* in Eastern Madagascar gradually increase in size from the coastal regions to the mountains. The birds from the eastern forests on the coast or at any rate on a very low level are the smallest and nearly alike in size on the different localities, though on an average smallest at Sianaka and Fanovana. From these two last localities the specimens examined measure : ♂♂ 75, 75, 75, 75, 76, 77, 78, 78 ; ♀♀ 71, 72, 73, 74, 75, 77 mm. From Maroantsetra, Ivohibe, and Iamposika they are almost of the same size. They measure : ♂♂ 77, 78, 79 ; ♀ 75 mm. With these specimens agree some older specimens in the London and Paris Museum, collected by Crossley and Humblot without any designation of locality on the label, but doubtless captured in the forests of the eastern lowlands. These birds measure : ♂♂ 75, 76, 79, 79, 79 ; ♀♀ 71, 74, 75, 76 mm. The birds originating from forests on a somewhat higher altitude, from Andapa, Fianarantsoa, Ankafana, are on an average bigger. They measure : ♂♂ 76, 77, 78, 79, 80, 80, 80 ; ♀♀ 75, 76, 76, 78 mm. All these birds I regard as typical *sharpei*.

In the mountains the birds are larger. Specimens from Manjakatompo measure : ♂♂ 80, 82, 82, 82, 84, 84, 84, 87 ; ♀♀ 79, 81, 82, 84 mm. Some specimens collected in " Betsileo," i.e. the interior high-plateau in the southern part of Madagascar, to the west of Fianarantsoa, measure : ♂♂ 80, 86 ; ♀ 82 mm. These somewhat larger birds I have called *interioris*. The two races thus measure:

M. i. sharpei : ♂♂ 75–80 (77·43), ♀♀ 71–78 (74·53) mm.

M. i. interioris : ♂♂ 80–87 (83·10), ♀♀ 79–84 (81·60) mm.

The differences in the measurements are best shown on the following schedule, giving the measurements of all specimens examined. As the females are smaller than the males, the two sexes are here kept apart.

Name of Subsp.	Wing-length in mm. :																
	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
♂♂, *sharpei* .	—	—	—	—	5	3	3	4	5	3	—	—	—	—	—	—	—
♂♂, *interioris*	—	—	—	—	—	—	—	—	—	2	—	3	—	3	—	1	1
♀♀, *sharpei* .	2	1	1	2	4	3	1	1	—	—	—	—	—	—	—	—	—
♀♀, *interioris*	—	—	—	—	—	—	—	—	1	—	1	2	—	1	—	—	—

I have not yet mentioned the type-specimen of *sharpei*, which is in the British Museum. This bird is named by Gray in *Ann. Mag. Nat. Hist.*, Vol. viii, 1871, p. 429, and it is thoroughly described by Sharpe in *Proc. Zool. Soc. London*, 1871, p. 317. The type-locality is Saralalan or Nossi Vola. According to Sharpe (*P.Z.S.*, 1870, p. 385) these places are situated south-east of Lake Alaotra, i.e. somewhere in the forest Sianaka, and the type must therefore belong to the *small* race. As a matter of fact, the type (an adult male) has a wing-length of 82 mm., whereas a series of eight other males from Sianaka measures 75–78 mm. (cf. above), and thus the type is an exceptionally big specimen.

Distribution : This subspecies occupies the interior high-plateau. It is met with on Betsileo and on Ankaratra. Perhaps it is now exterminated in the first locality, as the Franco-Anglo-American Expedition did not find it there, but it " existe encore dans la petite fôret de l'Ankaratra, sur le plateau central " (Delacour, *L'Oiseau*, 1932, p. 59).

Material : 54 specimens, which are distributed as follows :

39 *M. i. sharpei* (14 ♂♂, 10 ♀♀ in London ; 10 ♂♂, 5 ♀♀ in Paris).

15 *M. i. interioris* (6 ♂♂, 3 ♀♀ in London ; 4 ♂♂, 2 ♀♀ in Paris).

Remarks : The other races of *M. imerina* are of the same size as *interioris*, and so bigger than *sharpei*. I measure :

M. i. erythronota (Lav.) : 10 ♂♂ 83–89 ; 6 ♀♀ 79–85 mm.

M. i. imerina (Hartl.) : 7 ♂♂ 80–86 ; 3 ♀♀ 75–82 mm.

Nesillas typica monticola Hart. & Lav.

Nesillas typica monticola Hartert and Lavauden, *Bull. B.O.C.*, Vol. li, 1931, p. 56 : Tsaratanana.

Description : The specimens from the Ankaratra Mountains have a pronounced tendency to be paler. The breast is not so heavily spotted, the markings on the throat, on the sides of the breast and on the flanks not so dark, the ground-colour is paler, creamy-white. The upper-parts are paler, not so reddish-brown or dark brownish-olive as the lowland forms, but greyish-green. However, there is a remarkable variation in the *Nesillas*, and many *monticola* are indistinguishable

from *typica*, but by comparison of series of the two forms the difference is easily seen.

Measurements : A slightly larger form. The measurements of the wing of the eastern lowland forms and the montane form are as follows :

N. t. typica : 19 ♂♂ from the following localities : Vondrozo, Ivohibe, Iampasika, Manombo, Fianarantsoa, Tabiky measure : 62, 62, 62, 63, 64, 64, 65, 66, 66, 66, 66, 66, 66, 66, 67, 67, 68, 68, 68 mm.

16 ♀♀ from the same localities : 58, 58, 59, 59, 59, 59, 60, 60, 60, 60, 61, 62, 62, 63, 63, 63 mm.

N. t. ellisii [1] *:* 64 ♂♂ from the following localities : Maromandia, Bezona, Marotony, Ambre Mountains, Tsarakibany, Vohemar, Andapa, Antalaha, Maroantsetra measure : 57, 57, 58, 59, 59, 59, 59, 60, 60, 60, 61, 61, 61, 61, 61, 61, 61, 61, 61, 61, 62, 62, 62, 62, 62, 63, 63, 63, 63, 63, 63, 63, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 65, 65, 65, 65, 65, 65, 65, 65, 65, 65, 66, 66, 66, 66, 66, 66, 67, 67, 68 mm.

39 ♀♀ from the same localities : 56, 56, 57, 57, 57, 57, 57, 58, 58, 58, 58, 58, 58, 58, 58, 58, 59, 59, 59, 59, 59, 59, 60, 60, 60, 60, 60, 60, 61, 61, 61, 61, 62, 62, 62, 64, 64, 64, 65 mm.

N. t. monticola : 12 ♂♂ from Manjakatompo and 1 from Tananarive measure : 66, 67, 67, 67, 68, 68, 68, 69, 70, 70, 71, 71, 72 mm.

4 ♀♀ from Manjakatompo : 64, 65, 66, 67 mm. The three forms thus measure :

N. t. typica : ♂♂ 62–68 (65·37), ♀♀ 58–63 (60·38) mm.
N. t. ellisii : ♂♂ 57–68 (62·06), ♀♀ 56–65 (59·49) mm.
N. t. monticola : ♂♂ 66–72 (68·77), ♀♀ 64–67 (65·50) mm.

The differences in the measurements are best shown on the following schedule, giving the measurements of all specimens examined. Male and female are different in size and are therefore here kept apart.

Name of Subsp. :	Wing-length in mm. :																
	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
♂♂, *ellisii*	—	2	1	4	3	11	5	7	12	10	6	2	1	—	—	—	—
♂♂, *typica*	—	—	—	—	—	—	3	1	2	1	7	2	3	—	—	—	—
♂♂, *monticola*	—	—	—	—	—	—	—	—	—	—	1	3	3	1	2	2	1
♀♀, *ellisii*	2	5	9	6	6	4	3	—	3	1	—	—	—	—	—	—	—
♀♀, *typica*	—	—	2	4	4	1	2	3	—	—	—	—	—	—	—	—	—
♀♀, *monticola*	—	—	—	—	—	—	—	—	1	1	1	1	—	—	—	—	—

It cannot be denied, that a difference exists between the lowland birds and *monticola*, but only about 50 per cent. of the mountain birds are larger than the lowland forms. Combined with the, on an average, paler colouration, this may suffice to separate the montane population as a subspecies, certainly rather ill-defined. As a matter of fact, I should not have separated this mountain form if a name (*monticola* Hart. & Lav.) was not available beforehand. However, as the mountain specimens of *Nesillas typica* show the same tendency to grow larger, as do the other birds mentioned, I prefer to give them their own designation. The

[1] Owing to the great variation in the *Nesillas*, the two races *typica* and *ellisii* cannot always be distinguished, but as a rule *ellisii* is darker and supplied with more lipochrome, the specimens being more yellowish on the underparts, more dark-green on the upperparts, the streaks on throat and breast being darker and broader.

great variation in size in *ellisii*, compared with the other forms, is probably owing to the fact that some younger birds must also have been measured. I really do not think *ellisii* is smaller than *typica*. The greater part of the very small *ellisii* came from the north-west (Marotony, Bezona, etc.). The type-specimen of *monticola*, which I have examined in the Paris Museum, comes from the Tsaratanana Mountains (Oct. 1929), and is the only specimen from this place. These mountains are situated in the northern parts of the country between Andapa and Anaborano, and are quite isolated from the Ankaratra Mountains in Central Madagascar, where my specimens were secured. The type is said to be a female and has a wing-length of 71 mm., thus being larger than all other females examined. But even for a male it is a remarkable size, which corresponds with the birds from Ankaratra. Specimens captured on the slopes of Tsaratanana (at Andapa at about 6,000 ft.) do not differ from *ellisii*, as already pointed out by Delacour (*Bull. B.O.C.*, Vol. liii, 1932, p. 95). The type of *monticola*, however, is secured on the very top of the mountains, at an altitude of about 9,500 ft. The type-specimen is of the same colour as *ellisii*, i.e. darker and more greenish than the Ankaratra birds from higher elevations, but the differences between all these birds are so small, that I certainly will not name the Ankaratra specimens.

Delacour recently has discussed this bird in *L'Oiseau*, 1931, p. 478, and *ibid.*, 1932, p. 85, and *Bull. B.O.C.*, 1932, p. 95. He comes to the conclusion that *monticola* must be regarded as a synonym of *ellisii*, but he compares the measurements only with the other big race *obscura*, not with the small form *cllisii*. *N. t. monticola*, however, is paler than *obscura*; especially the specimens from the Ankaratra Mountains cannot be confounded with *obscura*.

Distribution: The Ankaratra [1] and Tsaratanana Mountains.

Material: 156 specimens, which are distributed as follows:

35 *N. t. typica* (8 ♂♂, 7 ♀♀ in London; 11 ♂♂, 9 ♀♀ in Paris).

103 *N. t. ellisii* (29 ♂♂, 19 ♀♀ in London; 35 ♂♂, 20 ♀♀ in Paris).

18 *N. t. monticola* (7 ♂♂, 2 ♀♀ in London; 6 ♂♂, 3 ♀♀ [2] in Paris).

Remarks: The other forms of *Nesillas typica*, inhabiting Madagascar, are rather large. I measure:

N. t. obscura Del.: 7 ♂♂ 66–73; 3 ♀♀ 61–69 mm.

N. t. lantzii (Gr.): 6 ♂♂ 63–70; 7 ♀♀ 59–64 mm.

In addition, *Nesillas typica* inhabits some of the Comoro Islands, but the wing-length of the forms here (*brevicauda, longicauda*) does not exceed 67 mm.

In this investigation more than 700 specimens of the five species mentioned have been examined. It is now possible to say that at least four remarkable montane forms are developed in the interior of Madagascar, viz.: *Newtonia brunneicauda monticola, Zosterops maderaspatana analoga, Saxicola sibilla ankaratrae, Monticola imerina interioris*. To these I have added a fifth form, *Nesillas typica monticola* Hart. & Lav., previously deseribed, which is rather ill-defined, but at any rate worthy of notice.

It is interesting to note that all five birds are modified in the same way, all being larger than their respective lowland form. The bigger size is the main character for these birds, and only by help of the difference in wing-length the couples of mountain and lowland forms may be distinguished. So under the

[1] A single specimen from Tananarive corresponds with this race.

[2] Including type of *monticola*.

similar ecological conditions in the mountains homologenous races have been differentiated. The larger size of the mountain-birds is probably a reaction against the lower temperature on the places at high altitudes. The waste of heat, caused by the radiation from the outer surface of an organism, is proportional to the area of the surface and to the difference between the temperature of the organism and the atmosphere. To keep the inner temperature of a homoeotherm animal at the normal height (in a bird about 42° C.), the organism, when living in a cold climate, is forced to augment its heat-capacity. An increased production of heat, however, is very troublesome or even perilous for the avian organism, and it therefore reduces the amount of heat lost to the atmosphere by diminishing the outer surface. The only method by which this can be undertaken in a bird is to increase the volume of the body ; the larger the bird grows, the smaller (*comparatively*) will be the surface, and on account of this the percentage of heat lost to the atmosphere will decrease (Bergmans rule).

To the difference in wing-length in some species is added a difference in colour of minor importance. In *Newtonia brunneicauda* the mountain race tends towards darker colours in the plumage, in *Nesillas typica* and *Monticola imerina* the mountain forms are somewhat paler than the lowland forms ; in *Zosterops maderaspatana* the throat is deeper yellow ; in *Saxicola torquata* no difference exists. Thus no rule appears to apply to the colouration, and all in all, the differences in colouration are very slight.

Besides these species several other birds are known to inhabit the interior parts of Madagascar, although the bird-life there is by far less rich than in the eastern coast-land. Several birds are very common on the high-plateau, e.g. *Cisticola cherina*, *Mirafra hova*, *Motacilla flaviventris*, &c., and in the forests around Manjakatompo *Nectarinia souimanga*, *Tchitrea mutata*, *Foudia omissa*, *Leptosomus discolor* and several others are met with ; none of which, however, differ from the forms inhabiting the coastal regions.